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Jeanine Townsend  
Clerk to the Board  
State Water Resources Control Board  
P.O. Box 100  
Sacramento, California 95812  
RE: Bay-Delta Workshop 2: Bay-Delta Fishery Resources

Dear Ms. Townsend:

American Rivers is providing comments in response to the State Water Resources Control Board's ("Board's") notice dated June 22, 2012, in which the Board presented the schedule for a series of workshops on particular topics associated with its review and potential revision of the 2006 Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary (Bay-Delta Plan). This letter addresses the topics to be discussed in the second workshop, Bay-Delta Fishery Resources (focused on pelagic fishes and salmonids), and responds to the two questions the Board posed in the June 22, 2012 notice. For the purposes of making our comments more useful to the Board, we have addressed the Board's two questions in reverse order. We address the Board's second question on scientific uncertainty and adaptive management first, and then address the question regarding what additional technical information the board should consider.

We also include some recommendations for consideration as the Board undertakes modification of the Bay-Delta Plan. Our comments build on previous American Rivers input on the Board's review of the Bay-Delta Plan (provide citation).

**Question two:** How should the State Water Board address scientific uncertainty and changing circumstances, including climate change, invasive species, and other issues? Specifically, what kind of adaptive management and collaboration (short, medium, and long-term), monitoring and special studies programs should the State Water Board consider related to Bay-Delta fisheries as part of this update to the Bay-Delta Plan?

1. The board should take action to facilitate flow and non-flow measures where there is relatively little scientific uncertainty. While scientific uncertainty on many issues is an understandable impediment to management action, the Board should not let scientific dispute about some issues impede action on matters where there is relatively little uncertainty. Adaptive Management is a strategy for managing the risk associated with

uncertainty, but the very best risk management strategy is to implement management strategies with certain benefits.

There is high certainty and clear and compelling evidence documented in numerous, peer-reviewed scientific articles that inundated floodplain habitat is very beneficial to Chinook salmon, Sacramento splittail, and other public trust resources (American Rivers et al. 2010).

There is also reason to believe that inundated floodplain habitat may be an important component of food web productivity, a potentially important variable effecting pelagic species such as Delta smelt. Dr. Kimmerer's comments and presentation in workshop #1 indicate that food web subsidies from upstream of the low salinity zone may be important for providing food resources to pelagic fish in the low salinity zone. If so, floodplain inundation may benefit not only salmon and splittail, but also pelagic species that utilize the low salinity zone. The same may be true for tidal marsh restoration, but there is a higher level of uncertainty regarding whether tidal marsh restoration would benefit salmon and splittail.

Floodplain inundation will also likely generate large phytoplankton blooms which could increase turbidity. Turbidity is a measure of the clarity of the water and can be influenced not only by the presence of suspended sediment, but also by the presence of biological particulates such as phytoplankton. The benefits and functions of biologically induced turbidity for pelagic fish as received very little attention to date.

2. Scientific certainty in a highly complex ecosystem is not the correct standard of evidence, and is not a realistically achievable standard of evidence, for making changes in the water management regulations of the Bay-Delta watershed, particularly when public trust resources are at risk of irreversible damage or extinction. It is not realistic to anticipate statistical certainty in an ecosystem as complex as the Delta. There are simply too many confounding variables. In most cases, it is not possible to control research experiments for all of the independent variables. In many cases where some control is possible, it could take years or even decades to generate statistically irrefutable information without intentional changes in flows designed to accelerate completion of adaptive management research.

Rather, the precautionary principle using the preponderance of evidence is the proper standard. Where several patterns, data points, and lines of evidence indicate that a Board action will benefit species on the verge of extinction, the board should take action, particularly where the underlying mechanism is partly or fully understood.

3. The board should consider the following criteria when deciding which measures to implement in the face of scientific uncertainty:
  - Magnitude of impact
  - Breadth of impact
  - Certainty of benefit

- Risk of undesirable and irreversible ecological impacts
- Reversibility: measures that are reversible are relatively low risk.
- Learning richness
- Time required to demonstrate outcomes

Increasing floodplain inundation, particularly by notching the Freemont weir or modifying floodplain configuration is a measure that scores very high on the criteria above. Floodplain restoration in the Yolo Bypass is the only measure evaluated through the BDCP which has a high certainty, high magnitude impact. The breadth of impact is large, because inundated floodplain habitat could have large impacts on the pelagic food web. There are some risks associated with mercury methylation and impacts to avian and terrestrial species, but any negative impact associated with opening a gate in the Freemont Weir could be entirely reversed (or managed) by closing the gate in the Freemont Weir (at certain times to reduce negative outcomes). Research regarding food web and turbidity benefits would provide an important learning opportunity for evaluating whether physical habitat restoration can yield benefits for pelagic species.

Similarly, increasing Delta flows at the right time is likely to have a high magnitude and breadth of impact. Sufficiently increasing Delta outflows will provide high certainty floodplain inundation benefits. Scientific certainty regarding the benefits of increased outflows in the absence of floodplain inundation may not be as high as certainty associated with floodplain inundation, but there is a very strong body of evidence that suggests it would benefit numerous species (TBI et al. 2010 and 2012). While there may be economic costs for junior water right users, there are little to no ecological risks. And lastly, increased flows are totally reversible if future data shows that the ecological benefits do not materialize.

#### **Recommendations regarding question number two:**

- a) The Board should take actions that will increase the area of frequently inundated floodplain habitat in the Delta.
- b) In combination with recommendation (a) above, the Board should require adaptive management research on the question of whether floodplain inundation in the Delta or upstream would provide food web resources or turbidity benefits for pelagic species and whether these benefits would create a population level effect.
- c) The Board should utilize the precautionary principle and preponderance of evidence approach to prevent irreversible harm to public trust resources.
- d) The Board should utilize the decision making criteria described in the comments above to guide decisions in the face of scientific uncertainty.

**Question one:** What additional scientific and technical information should the State Water Board consider to inform potential changes to the Bay-Delta Plan relating to Bay-Delta Fishery resources, and specifically pelagic fishes and salmonids that was not addressed in the 2009 Staff Report and the 2010 Delta Flow Criteria Report? For large reports or documents, what pages or chapters should be considered? What is the level of scientific certainty or uncertainty regarding the

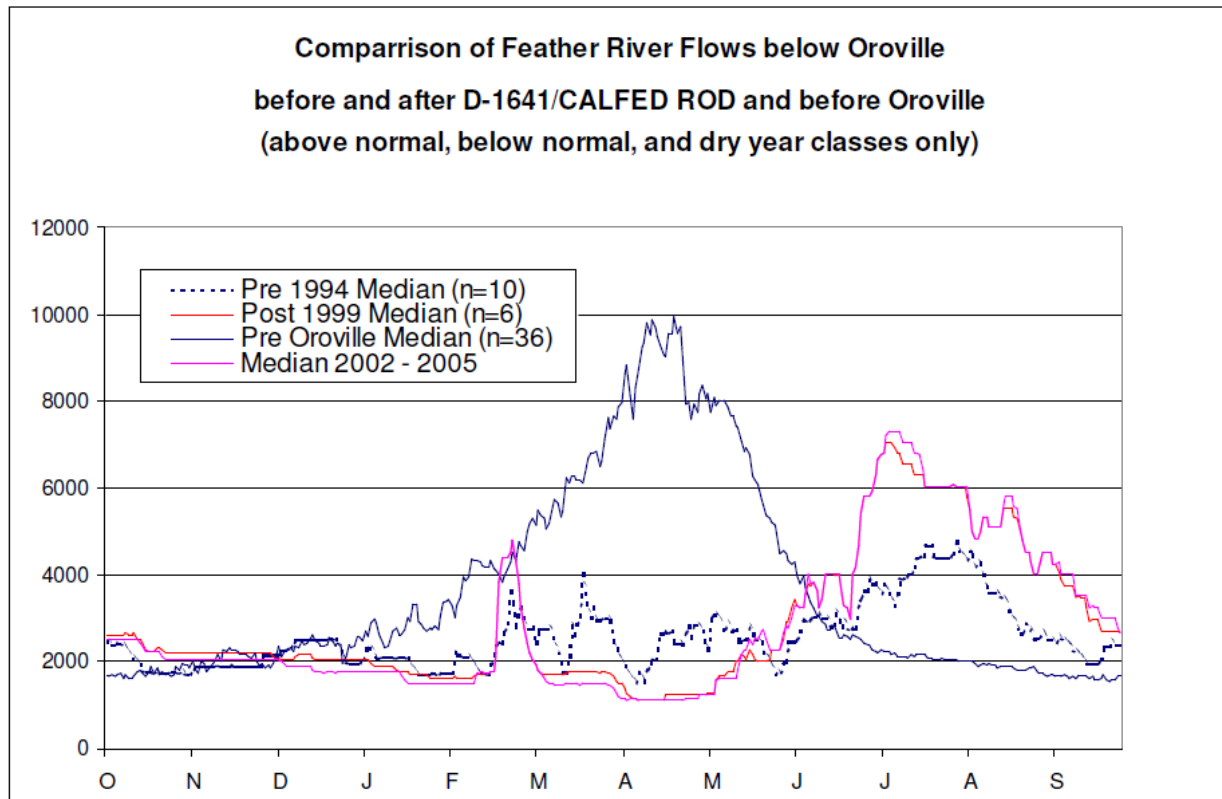
foregoing information? What changes to the Bay-Delta Plan should the State Water Board consider based on the above information to address existing circumstances and changing circumstances such as climate change and BDCP?

American Rivers has focused our comments on technical information pertaining to the subject of creating inundated floodplain habitat. Inundated habitat could either be created by changing flow regimes into the Delta or by implementing a physical solution to create more inundated habitat (levee set-backs, notching Fremont Weir) at existing instream flow levels. The technical analysis and information discussed below demonstrate that a physical solution alone is not sufficient to benefit salmon and other species dependent on frequent floodplain inundation. This is particularly true on the Feather River and the Lower San Joaquin where current flows are insufficient to inundate floodplain habitat. In these cases, increases in instream flows into the Delta during the spring months are necessary to create inundated floodplain habitat for salmon.

American Rivers recommends that the Board consider several recent technical analyses regarding the hydrologic connectivity of floodplains under existing and potential hydrology.

1. The Central Valley Flood Protection Plan (DWR, 2012) and associated technical appendices: The CVFPP calls for significantly expanding floodways and floodplains in the Delta through an expansion of the Yolo Bypass and creation of a new bypass parallel to Paradise Cut in the southern Delta. The plan also calls for modifying fish passage at all bypasses to better provide fish habitat for both upstream and downstream migrants. These expanded and modified bypasses could significantly improve conditions for salmon and other species, but only if flows are adequate to provide inundated floodplain habitat at the frequency required to provide population level benefits.
2. The Floodplain Inundation Potential (FIP) analysis conducted as an appendix to the flood plan (CVFPP, Attachment 9E): This analysis shows that levee removal from large areas of the levee protected floodplains would not result in sufficient frequency of inundated habitat to benefit salmon. Flows on the Feather River below Oroville Reservoir and the San Joaquin River in the Delta are insufficient to create inundated floodplain habitat in the critical spring months even if levees are fully removed. As discussed below, the lack of sufficient flows on the Feather River is caused by export/inflow regulations in the Delta. This new analysis validates previous testimony and information presented by American Rivers (American Rivers et al. 2010), which shows that lack of sufficient flows on the Feather River is caused by export/inflow regulations guiding Delta water management operations (figure 1). The perversion of Delta flows by the e/i ratio is also documented in the comments presented by Tom Cannon in workshop #1.

The frequency of floodplain inundation during late winter and spring in the Delta and upstream can be increased both by changing flow release from reservoirs and also by making physical changes in the channel and floodway (grading, levee setbacks, notching weirs, and intentionally raising the channel invert in strategic locations) that would cause inundation at lower flows. This “physical solution” could increase the frequency of inundation at a lower water cost.



**Figure 1:** Influence of the Sacramento-San Joaquin Delta Regulations on Feather River Hydrograph. The blue line depicts pre-Oroville median flows and approximates the natural flow regime. In 1995 the Water Quality Control Plan tightened restrictions on the timing of Delta diversions. The pre-1994 hydrograph compared to the post-1999 hydrograph illustrates how the hydrograph shifted spring flows to summer releases to optimize water diversions with the Delta export/inflow requirements.

3. South Delta Habitat Working Group report on opportunities for floodplain and habitat restoration in the South Delta (BDCP, Attachment E.A to Appendix 5.E): this planning study shows that restoration of large areas of floodplain habitat in the South Delta, particularly between Vernalis and Mossdale, could have significant benefits for San Joaquin river salmon, splittail, and other species. The benefits of floodplain restoration, however, would be significantly limited without changes in in-stream flows. The flow regime of the San Joaquin River is so altered that setting-back levees to restore habitat does not provide significant inundated floodplain habitat in most years. As discussed above, physical modifications to the channel and floodplain could offer a “physical solution” that would reduce the amount of water necessary to inundate floodplains.
4. BDCP Effects Analysis regarding the impacts of diversions on salmonids and other fish migrating from the American, Yuba, and Feather Rivers, as well at Butte Creek. Fisheries from these drainages that enter the Sacramento downstream of Fremont Weir will not benefit from notching of Fremont Weir and creation of inundated floodplain habitat in the

Yolo Bypass as proposed by BDCP. Levee setbacks or other efforts to create floodplain habitat downstream of the American River could provide benefits to fish runs from the lower Sacramento and Feather River tributaries, but BDCP has not yet identified any specific plans for such floodplain restoration.

**Recommendations regarding question number one:**

- a) Require increased flows during the late winter and early spring on upstream rivers (particularly the Feather and San Joaquin) to increase the frequency of floodplain inundation.
- b) Facilitate changes in water rights, if any, that may be necessary to allow for the diversion of water onto floodplains, particularly in the Yolo Bypass.
- c) Require reservoir operators to evaluate opportunities that could increase the frequency of floodplain inundation. These evaluations should consider how best to optimize reservoir releases with physical modifications to the channel and floodway to maximize the amount of inundated floodplain habitat associated with pulse flow releases from upstream reservoirs into the Delta.
- d) Request that the Bay Delta Conservation Plan EIR/EIS evaluate alternatives that employ a proportionate unimpaired flow approach or otherwise mimic natural flow patterns for the purpose of increasing the frequency of floodplain inundation.
- e) The Board should closely examine how BDCP will effect salmonid populations that enter the mainstem of the Sacramento River downstream of Fremont weir and request that BDCP consider floodplain restoration measures on the Sacramento River downstream of Fremont weir to offset the impacts of the proposed new diversion intakes on these populations.

Thank you for this opportunity to provide written comments. I have attached a list of references and submitted the new document referenced above in form requested by the Board. American Rivers looks forward to the upcoming workshops. If you have any questions about our comments or about the material attached, please contact me at (510) 388-8930.

Sincerely,



John Cain  
Conservation Director  
Bay-Delta and Flood Management

## References Cited

American Rivers, The Bay Institute, Environmental Defense Fund, Natural Heritage Institute, Natural Resources Defense Council, The Nature Conservancy [AR et al. 2010 exhibit 1] Written Testimony of John Cain, Dr. Jeff Opperman, and Dr. Mark Tompkins Before the State Water Resources Control Board, Exhibit 1

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Bay Delta Conservation Plan Attachment E.A to Appendix 5.E 'BDCP South Delta Habitat and Flood Corridor Planning, Corridor Description and Assessment Document'. September 10, 2012. Draft documents included in American Rivers comments for workshop #2 as S\_Delta\_Hab\_Cord and S\_Delta\_Hab\_Pres.

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